

WHAT IS CLAIMED IS:

1. A light pipe comprising:

5 a plate-like member including light output means formed in its upper surface so that light incident on an incidence side surface of said plate-like member is exited from said lower surface of said plate-like member through said light output means;

an adhesive layer having a refractive index lower than that of said plate-like member; and

10 an anti-reflection layer made of a circularly polarizer and bonded to a lower surface of said plate-like member through said adhesive layer.

2. A light pipe according to claim 1, wherein said 15 anti-reflection layer made of a circularly polarizer includes a quarter-wave plate, and a linearly polarizer.

3. A light pipe according to claim 2, wherein said 20 anti-reflection layer made of a circularly polarizer includes a quarter-wave plate, a half-wave plate and a linearly polarizer.

4. A light pipe according to claim 3, wherein a maximum 25 intensity of light exited from said lower surface of said plate-like member in terms of a plane perpendicular to reference planes of both said lower surface and incidence side surfaces

of said plate-like member is inclined at an angle of not larger than 30 degrees with respect to a normal to said reference plane of said lower surface of said plate-like member.

5 5. A light pipe according to claim 1, wherein said light output means formed in said upper surface of said plate-like member is constituted by a plurality of prismatic structures each shaped like a triangle in section and each having an optical path changing face inclined at an inclination angle
10 in a range of from 35 to 48 degrees with respect to said reference plate of said lower surface of said plate-like member.

15 6. A light pipe according to claim 1, wherein said light output means formed in said upper surface of said plate-like member is formed by a repetitive structure of prismatic structures each having an optical path changing face and a long side face and arranged at intervals of a pitch of from 50 μ m to 1.5 mm; each of said optical path changing faces is formed of a slope inclined downward from said incidence side
20 surface to a counter end surface opposite thereto at an inclination angle in a range of from 35 to 48 degrees with respect to said reference plane of said lower surface of said plate-like member; each of said long side faces is made of a slope inclined at an angle in a range of from 0 to 10 degrees with respect
25 to said reference plane; a difference between inclination angles

of any two long side faces is not larger than 5 degrees over a surface of said plate-like member; a difference between said inclination angles of adjacent ones of said long side faces is not larger than 1 degree; and a projected area of said long side faces on said reference plane is not smaller than 5 times as large as that of said optical path changing faces on said reference plane.

7. A light pipe according to claim 5, wherein
ridgelines of said prismatic structures constituting said light output means are inclined within a range of ± 30 degrees with respect to said reference plane of said incidence side surface.

8. A light pipe according to claim 1, wherein said refractive index of said adhesive layer for bonding said anti-reflection layer to said lower surface of said plate-like member is lower than that of said plate-like member by 0.01 or more.

9. A light pipe according to claim 1, wherein said refractive index of said adhesive layer for bonding said anti-reflection layer to said lower surface of said plate-like member is not higher than 1.47.

10. A light pipe according to claim 1, wherein said

adhesive layer for bonding said anti-reflection layer to said lower surface of said plate-like member is constituted by a tacky layer.

5 11. A plane light source unit wherein at least one light source is disposed on one side surface of a light pipe defined in claim 1.

10 12. A reflection type liquid-crystal display device wherein a liquid-crystal cell including a reflection layer is disposed on a light exit side of a plane light source unit defined in claim 11.

15 13. A light pipe comprising:
a plate-like member including light output means formed in its upper surface so that light incident on an incidence side surface of said plate-like member is exited from a lower surface of said plate-like member through said light output means;

20 an adhesive layer having a refractive index lower than that of said plate-like member;

and a light-diffusing layer including fine prismatic structures formed in its surface and bonded to said lower surface of said plate-like member through said adhesive layer.

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14. A light pipe according to claim 13, wherein said light-diffusing layer is constituted by a fine prismatic-structure layer provided on a transparent film.

5 15. A light pipe according to claim 13, wherein said light-diffusing layer further includes an anti-reflection layer provided on said fine prismatic-structure layer.

10 16. A light pipe according to claim 13, wherein a direction of maximum intensity of light exited from said lower surface in a plane perpendicular both to a reference plane of said lower surface of said plate-like member and to a reference plane of said incidence side surface of said plate-like member is within 30 degrees with respect to a normal to said reference
15 plane of said lower surface.

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17. A light pipe according to claim 13, wherein said light output means formed in the upper surface of said plate-like member is constituted by a plurality of sectionally triangular
20 prismatic structures having optical path changing faces each inclined at an inclination angle in a range of from 35 to 48 degrees with respect to said reference plane of said lower surface.

25 18. A light pipe according to claim 13, wherein said

Light output means formed in the upper surface of said plate-like member is formed by a repetitive structure of prismatic structures arranged at intervals of a pitch of from 50 μm to 1.5 mm and each having an optical path changing face and a long side face; each of said optical path changing faces is constituted by a slope inclined downward from the incidence side surface side to a counter end side at an inclination angle in a range of from 35 to 48 degrees with respect to said reference plane of said lower surface so that a projected width of each of said slopes on said reference plane is not larger than 40 μm ; and each of said long side faces is constituted by a slope inclined at an inclination angle in a range of from 0 to 10 degrees with respect to said reference plane so that an angle difference between any two long side faces over a surface of said plate-like member is not larger than 5 degrees, so that a difference between inclination angles of adjacent ones of said long side faces is not larger than 1 degree and so that a projected area of said long side faces on said reference plane is not smaller than 5 times as large as a projected area of said optical path changing faces on said reference plane.

19. A light pipe according to claim 17, wherein ridgelines of said prismatic structures constituting said light output means are in a range of ± 30 degrees with respect to said reference plane of said incidence side surface.

20. A light pipe according to claim 13, wherein the refractive index of said adhesive layer for bonding said light-diffusing layer to said lower surface of said plate-like member is lower by a value of from 0.01 to 0.2 than that of said plate-like member; and a refractive index of said light-diffusing layer is higher than that of said adhesive layer.

21. A light pipe according to claim 13, wherein the refractive index of said adhesive layer for bonding said light-diffusing layer to said lower surface of said plate-like member is not higher than 1.47.

22. A light pipe according to claim 13, wherein the refractive index of said adhesive layer for bonding said light-diffusing layer to said lower surface of said plate-like member is constituted by a tacky layer.

23. A plane light source unit wherein at least one light source is disposed on one side surface of a light pipe defined in claim 13.

24. A reflection type liquid-crystal display device wherein a liquid-crystal cell including a reflection layer is disposed on a light exit side of a plane light source unit defined in claim 23.